What is claimed is:

1. A resonator for use in a filter, comprising a cylinder which has a ratio of an inside diameter to an outside diameter belonging to a range which is larger than about 1 : 3 and smaller than or equal to about 1 : 3.75 and whose length (H) is about $\lambda/4$, wherein λ is a wavelength of a plane wave provided to the resonator.

2. The resonator as recited in claim 1, wherein the resonator has the inside diameter belonging to a range which is larger than about 8 mm and smaller than or equal to about 10 mm when the outside diameter is determined as about 30 mm.

3. The resonator as recited in claim 1, wherein the resonator has the inside diameter belonging to a range which is larger than about 6.7 mm and smaller than or equal to about 8.3 mm when the outside diameter is decided as about 25 mm.

4. The resonator as recited in claim 1, wherein the resonator has the inside diameter belonging to a range which is larger than about 5.3 mm and smaller than or equal to about 6.6 mm when the outside diameter is set to about 20 mm.

5. A method for manufacturing a resonator filter to minimize the current flowing through each resonator constructing the resonator filter made of several resonators,

which makes characteristic impedance of an equivalent circuit of the resonator filter having a value in a range which is larger than about 65 Ω and smaller than or equal to about 79 Ω.

6. The method according to claim 5, wherein inductance of the equivalent circuit is determined according to the characteristic impedance as follows:

$$L = \frac{4}{\pi Y_0 \omega_0}$$

wherein ω_0 represents a resonant frequency of the resonator filter.

7. The method according to claim 5 further employing a small ripple in order to increase the coupling between the resonators of the equivalent circuit.

8. A resonator filter manufactured by the method of claim 5.